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ACTA 2004 / 00130

**Setifikaat**

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DEPARTMENT VAN HANDERL  
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**Certificate**

PATENT OFFICE

DEPARTMENT OF TRADE  
AND INDUSTRY

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ACTA 2004 / 00130

The attached documents are true copies of the Form P2, P1, P6 and a Provisional Specification of a South African Patent application No. 2003/08754

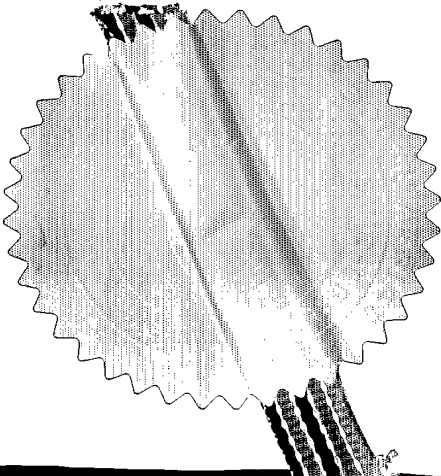
In the name of : **DETNET SOLUTIONS (PTY) LTD**

Date : **10<sup>th</sup> NOVEMBER 2003**

Entitled : **BLAST KEY**

Geteken te **PRETORIA** in die Republiek van Suid-Afrika, hierdie **13<sup>TH</sup>** dag van **DECEMBER 2006**  
Signed at in the Republic of South Africa, this day of

Registrateur van Patente  
Registrar of Patents



McCALLUM, RADEMEYER & FREIMOND  
Ref: P20079

FORM P1

REPUBLIC OF SOUTH AFRICA  
PATENTS ACT, 1978

APPLICATION FOR A PATENT AND ACKNOWLEDGEMENT OF RECEIPT

(Section 30(1) - Regulation 22)

The grant of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate

Revenue Stamps or Revenue Franking  
Machine Impression

OFFICIAL APPLICATION NO. ...

21° 01 • 20 03 / 8 7 5 4

OFFICIAL DATE STAMP

FULL NAME(S) OF APPLICANT(S)

71 DETNET SOLUTIONS (PTY) LTD

ADDRESS(ES) OF APPLICANT(S)

Parklands Place, Pinelands, 1645

TITLE OF INVENTION

54 BLAST KEY

Priority is claimed as set out on the accompanying Form P2.

The earliest priority claimed is: NONE

This application is a patent of addition to Patent Application No.

21 01

This application is a fresh application in terms of section 37 and based on Application No.

21 01

THIS APPLICATION IS ACCOMPANIED BY:

- ☒ 1 A single copy of a provisional specification of ...8... pages
- ☐ 2 Two copies of a complete specification of ..... pages
- ☒ 3 ...1... Sheets of Informal Drawings
- ☐ 4 ..... Sheets of Formal Drawings
- ☐ 5 Publication particulars and abstract (Form P8 in duplicate)
- ☐ 6 A copy of Figure ..... of drawings (if any) for the abstract
- ☒ 7 Assignment of Invention
- ☐ 8 Certified priority document(s) Number(s)
- ☐ 9 Translation of priority document(s)
- ☐ 10 An assignment of priority rights
- ☐ 11 A copy of the Form P2 and the specification of SA Patent Application
- ☒ 12 A declaration and power of attorney on Form P3
- ☐ 13 Request for ante-dating on Form P4
- ☐ 14 Request for classification on Form P9
- ☒ 15 Form P2 in duplicate

21 01

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Dated 10 November 2003

McCALLUM, RADEMEYER & FREIMOND  
PATENT AGENTS FOR APPLICANT(S)

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REPUBLIC OF SOUTH AFRICA  
PATENTS ACT, 1978

**PROVISIONAL SPECIFICATION**

(Section 30(1) - Regulation 27)

OFFICIAL APPLICATION NO

LODGING DATE

21	2003/08754
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22	10 November 2003
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FULL NAME(S) OF APPLICANT(S)

71	DETNET SOLUTIONS (PTY) LTD
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FULL NAME(S) OF INVENTOR(S)

72	VAN WYK, Riaan Lingenfelder ; GARSIDE, Graham
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TITLE OF INVENTION

54	BLAST KEY
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BACKGROUND OF THE INVENTION

[0001] This invention relates to a blast key for use in a blasting arrangement.

[0002] A typical blasting arrangement includes a plurality of detonators and a blast control unit which is used for firing the detonators in a controlled manner.

5 The blasting arrangement also includes a blast energy source and a blast key which constitutes a physical link in an electrical path between the blast energy source and the detonators. The blast key is usually constituted by a switch, a relay contact or a physically removable link. Once the blast key is in place and is connected to the remainder of the blast arrangement the detonators can be  
10 armed and fired. The blast key is removable – a characteristic which is intended to prevent unwanted or inadvertent firing of the detonators.

[0003] A drawback with a blast key of the aforementioned kind is that the blast key can fail, to a closed state, due to a variety of sources for example excessive vibration or shock. It is also possible for contacts with which the blast key is to  
15 be engaged, to be short-circuited by any conductive material which accidentally bridges the contacts. Under this type of situation the blast control unit can cause an unplanned initiation of the detonators with potentially serious adverse consequences.

SUMMARY OF THE INVENTION

[0004] The invention provides a blast key which includes a body and a blast energy generator in or on the body.

5 [0005] The blast key may include a switch which is in series with the blast energy generator.

[0006] The switch may be manually, electrically or electromechanically controlled.

[0007] The blast key may include a logic control unit or one or more control switches or buttons for controlling the switch.

10 [0008] The body may be in the nature of a housing in which the blast energy generator is mounted.

[0009] The body may include a plurality of terminals to enable the blast energy generator to be connected to a blast control unit.

15 [0010] Although it is a less preferable feature it is possible for the blast key to include an energy source for actuating the blast energy generator, in a controlled manner.

[0011] The invention also provides a blasting arrangement which includes a plurality of detonators, a blast control unit, and a blast key which is removably connected, directly or indirectly, to the detonators and the blast control unit, and wherein the blast key includes a blast energy generator which provides electrical energy at a predetermined voltage for arming the detonators.

[0012] The electrical energy which is provided by the blast energy generator may be derived from an energy source which is included in the blast key or, more preferably, from an energy source which is under the control of the blast control unit.

#### BRIEF DESCRIPTION OF THE DRAWING

[0013] The invention is further described by way of example only with reference to the accompanying drawing which is a block diagram illustration of a blasting arrangement which makes use of a blast key according to the invention.

#### DESCRIPTION OF PREFERRED EMBODIMENT

[0014] The accompanying drawing illustrates a blasting arrangement 10 which includes a blast control unit 12, a plurality of detonators 14 of any appropriate kind which are connected in a desired configuration to the blast control unit 12, and a blast key 16 according to the invention.

[0015] The blast key may take on any of a plurality of different configurations.

The blast key, in the illustrated example, includes a body 18 in the nature of a

small portable housing in or on which are mounted a blast energy generator 22, a switch 24 which is connected in series to the blast energy generator, control logic 26, and a plurality of control buttons 28.

5 [0016] The blast control unit 12 is of a kind which is known in the art and for this reason its construction and operation are not described in detail herein. The blast control unit includes a plurality of terminals 30. The body 18 includes a corresponding plurality of terminals 32 which enable the blast key to be electrically connected to the blast control unit when required.

10 [0017] The body 18 is a portable device which can be removed from the blast arrangement and which can be connected to the blast arrangement when necessary. In one example of the invention the blast control unit 12 provides energy to the blast energy generator 22, when the switch 24 (which is optional) is closed, and the blast energy generator changes the voltage of the electrical energy, using techniques which are known in the art, to a level which is suitable  
15 for arming the detonators 14. It is to be noted that, as a safety feature, the blast control unit 12 is physically incapable of directly providing energy at a suitable voltage level for arming the detonators.

[0018] As the blast energy generator 22 is physically removable, together with the body 18, from the blasting arrangement, the safety of the blasting system is  
20 enhanced. The blast control unit 12 is inherently safe and, provided the blast key 16 is not connected to the blast control unit, excessive vibration or shock or an



electrical short-circuit will not put the blast control unit into a condition in which it can set off a blast of the detonators 14. This can occur only if the blast key 16 is physically engaged with the blast control unit and the blast control unit is used to energise the blast energy generator.

5       **[0019]** The safety of the blast key can be further enhanced by making use of the switch 24. The switch 24 may be a manual switch, an electronic switch or an electromechanical switch. In the last two mentioned cases the switch can be controlled by means of the control logic block 26 so that the switch can only be operated if a correct logic state is present. Logic state changes can occur from  
10       different sources for example from a signal or signals input via the control buttons 28 on the blast key or from an electrical signal or signals from other control equipment via suitable communications links, or from both sources in combination.

15       **[0020]** The control buttons 28 can be used for functions like "arm", a control mode which causes the blast energy generator to start generating electrical energy at a suitable voltage, and "fire", a control mode which is used to initiate firing of the detonators 14.

20       **[0021]** The blast arrangement 10 is inherently safe if the blast key 16 is not engaged with the blast control unit. Once the blast key is connected to the remainder of the blast arrangement the inherent safety of the system is not compromised for the arrangement only changes to a state in which it is capable

of causing blasting once the blast key receives the correct instructions from the blast control unit 12 or if the local control logic unit 26 or actuation of the control buttons 28 indicates that a correct logic state has been achieved. The two last-mentioned conditions cause the switch 24 to close.

5     [0022] The detachable blast key with the on-board blast energy generator increases the shock tolerance of the blasting control equipment and eliminates problems which can arise with prior art devices which have physical contacts which can be shorted or, in the case of a relay, which have contacts which are "sticky" and do not automatically return to normally open.

10    [0023] It is not usually possible for the blast key to power itself. Instead the blast key relies on other control equipment e.g. the blast control unit, to provide it with energy. With this configuration the blast key is therefore inherently safe as a unit when it is disconnected from the blast arrangement.

15    [0024] It is possible, nonetheless, for the blast key to include an "on-board" energy source 40 which is shown in dotted lines. The source cannot energise the blast energy generator 22 until the switch 24 is closed. An interlock can readily be provided to ensure that the switch 24 can only be closed if the blast key is in circuit and connected to the blast control unit 12 which then automatically assumes control of the switch 24 and the blast energy generator  
20    22.

[0025] The optional control logic unit 26 provides an added state of logic which validates the remainder of the control equipment which is used together with the blast energy source.

DATED this 10<sup>th</sup> day of November 2003.

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McCALLUM RADEMEYER & FREIMOND  
Patent Agents for the Applicant

